

What is claimed is:

1. A catheter for removing core material from one or more plaque deposits on an inside wall of a blood vessel, said catheter comprising:

an elongate shaft having a proximal end and a distal end; and

a collection array comprising a plurality of collection lumens disposed about a portion of the elongate shaft, proximate the distal end of the elongated shaft.

2. The catheter of claim 1 further comprising a suction means fluidly coupled to the proximal end of the collection array.

3. The catheter of claim 1, wherein the collection array is radially extendible and radially collapsible.

4. The catheter of claim 1 further comprising means for radially extending and/or radially collapsing the collection array.

5. The catheter of claim 4, wherein the means for radially extending and/or radially collapsing the collection array includes a hydraulic means.

6. The catheter of claim 5, wherein the hydraulic means comprises a balloon, said balloon having an inflated state and a deflated state.

7. The catheter of claim 4, wherein the means for radially extending and/or radially collapsing the collection array includes a mechanical means.

8. The catheter of claim 1, wherein each collection lumen is defined, at least in part, by a first circumferential wall, a second circumferential wall, a first radial wall, and a second radial wall.

9. The catheter of claim 8, wherein for each collection lumen, said first and second radial walls are disposed between said first and second circumferential walls.

10. The catheter of claim 8, wherein at least one of the radial walls is substantially more rigid than said first and second circumferential walls.

11. The catheter of claim 8, wherein the first circumferential wall defines, at least in part, an outer surface of a balloon.

12. The catheter of claim 8, wherein said first and second circumferential walls and said first and second radial walls are constructed and arranged such that the collection array is collapsible into a predefined shape.

13. The catheter of claim 1, wherein the distal end of the collection array includes a plurality of collection ports, and the proximal end of the collection array includes a plurality of retrieval ports.

14. The catheter of claim 13, wherein the retrieval ports are fluidly connectible to a suction means.

15. The catheter of claim 13, wherein at least one collection port is directed axially.

16. The catheter of claim 13, wherein at least one collection port is directed radially.

17. The catheter of claim 1, wherein at least one collection lumen provides fluid communication between at least one collection port and at least one retrieval port.

18. The catheter of claim 1, wherein the second circumferential wall of the collection array defines, at least in part, an outer extent of an engagement surface for:

engaging the inner wall of the blood vessel and the one or more plaque deposits;  
rupturing the one or more plaque deposits in one or more locations; and  
urging the core material from the one or more ruptured plaque deposits.

19. A system for removing core material from one or more plaque deposits on an inside wall of a blood vessel, said system comprising:

a catheter comprising an elongated shaft with radially extendible and/or radially collapsible collection array with the distal end of the collection array disposed about a portion of the elongated shaft proximate the distal end of the elongated shaft;

means for rupturing the one or more plaque deposits in one or more locations; and

suction means for extracting thrombi, debris, core material urged from the one or more ruptured plaque deposits, etc., from the lumen of the blood vessel.

20. The system of claim 19 further comprising means for radially extending and/or radially collapsing the collection array.

21. The system of claim 19 wherein the collection array comprises a plurality of collection lumens.

22. A method for removing core material from one or more plaque deposits on an inside wall of a blood vessel, said method comprising the steps of:

providing a catheter comprising an elongated shaft with radially extendible and/or radially collapsible collection array with the distal end of the collection array disposed about a portion of the elongated shaft proximate the distal end of the elongated shaft;

inserting the distal end of the catheter into a lumen of the blood vessel;

positioning the distal end of the collection array proximate one or more plaque deposits;

extending the collection array to engage the inner surface of the blood vessel and the one or more plaque deposits, rupturing the one or more plaque deposits in one or more locations, and urging the core material from the one or more ruptured plaque deposits; and

extracting thrombi, debris, core material urged from the one or more ruptured plaque deposits, etc., from the lumen of the blood vessel using suction means fluidly coupled to the proximal end of the collection array.